Village Chicken Production Handbook

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PREFACE

Keeping chicken can make a substantial contribution to household nutrition and food security throughout the developing world including Ethiopia. It helps diversify incomes and provides quality food, energy, fertilizer and a renewable asset for the rural households.

Small-scale chicken producers are however constrained by poor access to markets, goods and services; they have weak institutions and lack skills, knowledge and appropriate technologies. The result is that both production and productivity remain well below potential and losses and wastage can be high. However, adapted breeds, local feed resources and appropriate vaccines are available, along with proven technologies that can substantially improve productivity and income generation.

ENGINE recognizes the important contribution that chicken can make to human nutrition and poverty alleviation and has program that support vulnerable rural households on improved village chicken production for those interested in chicken rearing with the aim of household nutrition improvement and economic opportunities.

ENGINE target the most vulnerable households at reproductive age group, have children under 5 and those economically in need, disabled and affected by HIV Aids to bring substantial change on the prevailing under nutrition problem in Ethiopia.

This manual is based on existing knowledge on how to improve village chicken production systems with relatively minimum inputs. It provides a comprehensive and valuable technical guide for those in government service or aid agencies, wishing to provide a comprehensive and practical training for village chicken producers in the rural areas aimed to improve the livelihoods and nutrition of the rural poor.

The manual deals with improved free-range systems consisting of small flocks of local or preferably cross-bred chickens. All aspects of small-scale chicken production are discussed in this manual including basic introduction, management, housing, feed and feeding, marketing, health and disease management.

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INTRODUCTION

1. Background

Ethiopian indigenous chickens have a variety of morphological appearances. They vary in colour, comb type, body conformation and weight, and may or may not possess shank feather. Eggs have thick shells and deep yellow coloured yolk. Indigenous chickens, however, have low productivity - average annual egg production is estimated at 60 eggs (average 38 g); while the carcass at 6 months of age is about 0.5 kg from a live bird of about 1.5kg. Low productivity is also due to low hatchability at about 70% and high mortality. Estimated 40-60% of chicks die during their first eight weeks mainly due to disease and predators. The low productivity of indigenous chicken can also be part attributed to the fact that traditionally chickens receive little care. At night they are sheltered in small hen houses or in a room of the family house, to protect them from predators and bad weather. During the day, the chickens seek their food around the house.

1.1. Characteristics of village chicken

- comprise local genetic stock but rarely, interbred with improved stock
- are raised extensively in relatively small numbers (between 1–50)
- are not usually confined and obtain most of their diet from scavenging for food and water around the home (including household wastes) and village
- require minimal investment in inputs, with most if not all of the inputs generated around the home
- engage labour inputs that are not salaried but are drawn from the family, with women and children commonly most responsible for their care
- production is geared essentially toward home consumption and savings (a living bank) for small expenses such as school fees and medicines

1.2. Importance of chicken Rearing

Chicken rearing has various nutritional, healths, economical and social benefits.

1.2. 1. Chicken egg and meat has nutrition and health benefit

- Animal protein consumed in rural areas frequently comes from village chicken meat and eggs
- Chicken meat and eggs provide a readily available, high-quality source of proteins, vitamins and micronutrients
- Eggs are an excellent source of iron, zinc and vitamin A, all of which are essential to health, growth and wellbeing
- Chickens and eggs contribute to a nutritious, balanced diet, which is especially important for children, nursing mothers and people who are ill
- Chickens however are an important source of food for women post-birth; chickens are payment to villagers for local health services

1.2.2. Economic and Social benefit

- Chickens can be sold or bartered to meet family needs such as medicines, clothes and school fees
- In this way, they act as a ready source of cash for emergencies and small purchases
- Village chickens provide manure and play a role in pest control
- They are also important for special festivals or to meet social events
- They are generally owned and managed by women and children
- Simple changes in management of village chickens can significantly improve production and the living conditions of many rural families in terms of enhanced nutrition and income generation through the sale of surplus chickens or eggs
- Improved village chicken production is therefore a low-cost and important aspect of rural development
- Chickens are gifts to newly married couples; and chickens strengthen social networks between women
- In addition to these, the spiritual benefit of sacrifice of indigenous chicken types has also an important place in the cultural, social and religious functions of the Ethiopian society

1.3. Why demand for chicken rearing is increasing?

- Significant returns can be achieved from village chickens without the need for expensive housing, complex technology and funding for the purchase of inputs not available locally
- Chicken meat and eggs are a source of high-quality nutrients (e.g. proteins and micronutrients) that are often otherwise unavailable to resource-poor families
- Village chickens are often cared for by women and children and so programs that improve production will simultaneously improve the income and knowledge of these household members

1.4. Challenges in village chicken production system

- high mortality rate which could reach as high as 80–90% within the first few weeks after hatching, due to diseases and predation
- Feed inadequacy in terms of both quantity and quality. Feed is below the requirement for optimum egg production and the deficiency is more serious during the short rainy and dry seasons
- low productivity of local chicken
- Inadequate extension services
- inadequate credit facilities
- lack of organized marketing system
- seasonal fluctuation of price

1.5. Socio-cultural constraints to chicken production

- The value placed upon chicken for use at ceremonies and festivals or even as a source of income in times of need but not as a source of daily food nor as a regular source of income

- Some regard chickens as their pets or part of the family, thus it is only the arrival of an important unexpected visitor that could allow their use as food, although they can be sold without regret and the money utilized

1.6. Gender and Village Chicken

- Knowing who is responsible for raising village chickens is of the utmost importance when planning to improve production
- The different members of the household can have different, even contradictory, interests in livestock management
- Men and women may have different interests in relation to animals they have access to and control over
- With the animals raised, each species plays a specific role and is owned and cared for by different individuals in the household
- Chicken products are among the few agricultural products directly accessible to women in rural areas and hence increased food production from chickens will improve household food security;
- Village chicken production is not strongly associated with land resource, which is one of the main production constraints among the disadvantaged members of the community
- It was found that all gender groups are involved in chicken management
- Construction of shelters was mainly done by men, or by men and children
- Results also showed that, in Ethiopia, management of chickens was fully in the domain of women and children
- Women manage and prepare nests for laying and brooding, especially where fostering of eggs or chicks was practiced

1.7. Understanding Chicken behavior

- In the wild, chickens will form small flocks of 1-5 hens with one cock
- Normally smallholder farmers will keep small flocks of 4-10 hens and one cock, but flocks may vary from one up to around 30 adults and young growers, depending on the feed resource base and disease level in the area
- Up to this number they will still be able to recognize each other, which will help minimize conflicts among the birds
- If a low-ranking hen comes too close to a hen of higher rank, the latter may indicate this by stretching her neck and turning her bill towards the intruder
- Normally this will suffice for the other to retire. The ranking may change according to age, brooding, and other factors
- The system of more or less stable dominance is very practical, since the animals can be free to concentrate on finding food and watch out for enemies once the pecking order is established
- A hen will often find a dark, quiet place for laying eggs and for brooding. After 21 days of incubation, fertile eggs will hatch
- Chicken have a very constant rhythm day in and day out
- In the early morning and late afternoon they scavenge for food
- Later in the morning the hens will often lay eggs, and at noon they will rest
- When they sleep at night, they prefer to sit high in order not to be easy preys for predators

Fig 1: Dust bathing is important for chicken to keep

- To protect against very high or low temperatures and to be fit to escape predators, it is important for birds to have good feathers
- They therefore spend much time cleaning and preening their feathers with their beaks
- Further, at least once a day, they will dust bathe, which also protects them against external parasites
- The birds should always have access to a dry place for dust bathing
- If they prefer a certain place, the farmer should add a little dry lime or ash to protect them against parasites

1.8. Simple rules for chicken and breed selection

- A breed is a group of Chicken with a characteristic body form and feather contours
- Features such as the comb, colour of ear lobes and shank colours and length are usually determined by breed
- You should practice judging the external features of cocks, hens, growers and chicks

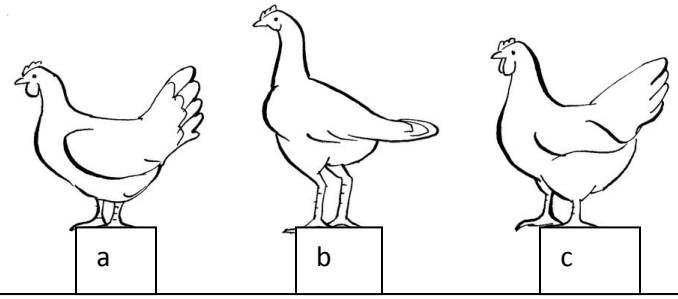


Fig. 2: Typical breeds producing eggs (a), meat (b) and both (c)

- Always choose birds with a lively behavior
- Always check whether the hens are in lay
- Potentially good layer has a long straight back a broad bottom
- Always check the belly and navel spot of newly hatched chicks
- Keep new birds isolated for a few weeks before introducing them into the flock
- The results of crossbreeding should always be monitored carefully

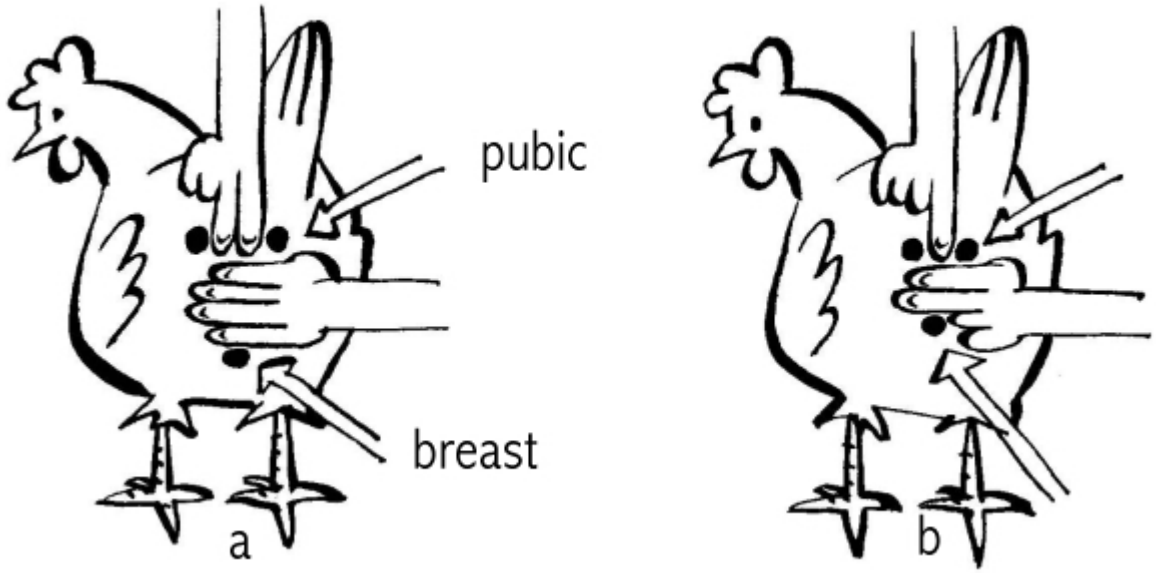


Fig. 3: Hen in lay (a) and non-layer hen (b)

FLOCK MANAGEMENT

A village hen often weighs no more than 1.2 – 1.5 kg at the point of lay. A village cock weighs maybe 1.4 – 2.0 kg at age of maturity. Poultry need a good supply of varied feed and of clean water. Depending on the time of the year they will be able to find part of their feed by scavenging in the surroundings of the household. But often they will need an extra supply of nutrients in order to gain weight and for hens to lay a good quantity of eggs. Especially the small chicks need good protein rich feeds such as balanced feeds or from simple supplementary sources such as maggots, snails, termites etc.

2.1. Keeping the flock healthy and productive

- Do not buy animals at the market from uncontrolled sources, especially not during periods when outbreaks of diseases are common
- They may introduce contagious diseases into your flock
- Vaccinate all birds against Newcastle Disease and other prevailing diseases such as Fowl Pox on a regular basis to prevent high mortality
- Small chicks should be vaccinated against the common contagious diseases at the age of 2-3 weeks
- Revaccination should always be performed according to the instructions (see Health and Management Chapter)

2.2 General hygiene

- In case of serious diseases you should slaughter the chickens (it can be eaten if cooked well), call the veterinarian, or
- Use drugs if you feel absolutely sure that you know the disease
- If you do not kill sick chick (en) at once, it must be separated from the others
- Sick birds (or parts from sick birds) should be burned or buried deep enough to avoid that dogs and other animals dig them up and spread the disease
- If you have many sick animals, do not introduce new birds, and do not vaccinate
- Before introducing new birds to your flock, you should keep them isolated for one to two weeks

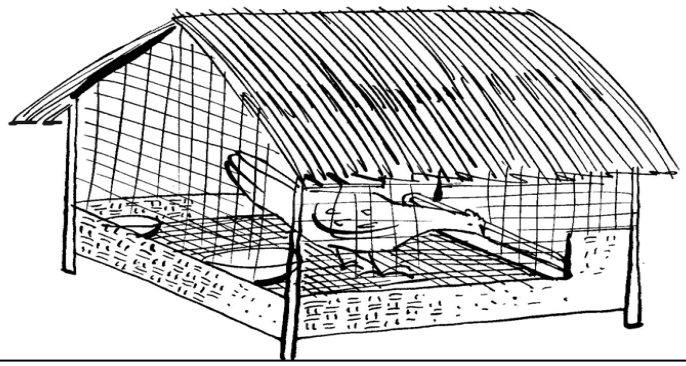


Fig. 4: A separate shed may be necessary to isolate ill or newly purchased birds serving with feed and water

- In order to prevent internal as well as external parasites a good hygiene is a must
- So every day the feeders and drinkers should be washed, and the house and the nests must be cleaned for droppings and insects
- Put fresh straw or hay in the nests weekly. Adding a little ash on top may help prevent parasites
- At least once a year, and always after serious outbreaks of diseases, the house, perches, and nests should be disinfected by thorough cleaning and lime-washing
- Alternative ways of disinfection, e.g. smoking, may be used but are less effective
- The birds should always have access to a dry place for dust bathing. If they prefer a certain place, you may add a little ash against the parasites
- You may encounter problems with hens pecking each other, but mostly in flocks with high density, or if you keep local birds inside during the day
- Wounds from pecking should be treated immediately to avoid cannibalism in the flock
- The drinker and feeder should be carefully cleaned early morning and late evening to avoid spreading of diseases

Fig. 5: Pecking often occur if local birds are kept inside for days

- It is very important to spend some time each day observing every chicken carefully
- In this way early signs of disease, malnutrition, or other problems may be discovered, and the necessary precautions taken
- Knowing each hen will also help you choose eggs from the best hen for hatching, so that the chicks may inherit her qualities

Fig.6: Careful observation of the flock on a daily basis is important

2.3 Flock size

- For table egg production, you only need hens
- However, some farmers keep one cock with the hens to watch for predators and to facilitate the pecking order, thus minimizing conflicts within the flock
- To produce fertile, hatchable eggs, you will need one cock for approximately 10-15 hens
- When surplus cocks reach a marketable size, they should be sold, slaughtered, or given away as presents, to prevent the cocks from eating the scarce feed resources, as well as fighting and stressing the hens
- You may easily recognize young cocks by their tail feathers, their comb, and their general (aggressive) behavior and appearance in comparison to the hens
- Always take into consideration that the size of the flock should match the size of the house, the amount of feed you can afford to buy and the feed resources in the environment (scavenging feed resource base)

2.4 Laying, brooding and hatching

- Often a free-range hen will lay the first eggs at the age of 22-28 weeks and lay 3-4 clutches of 10-15 eggs a year, depending on season, and in particular availability of feeds
- A hen will often find a dark, quiet place for laying eggs and for brooding
- She does not want to be disturbed by the others, and she wants to feel safe from predators and passers-by
- Unfortunately, many eggs go bad before they are hatched, because of disturbance, lack of nests, and annoying ecto-parasites making the hen leave the nest frequently, with resulting low hatchability
- After 21 days of incubation remaining eggs will hatch
- Most free-range poultry keepers will let young chicks follow the mother hen immediately after hatching

- The result is very high chick mortality during the first weeks of age, mainly due to predation by eagles and snakes, drowning, from road accidents and general chick exhaustion

2.5 Natural incubation and hatching

- For chickens it takes 21 days for eggs to hatch
- Eggs should be fresh before incubation
- The age of eggs should be no more than 10 days, when stored at temperatures below 20º C
- If the temperature is higher, the eggs should be no more than 5 days old
- To obtain the best incubation result, the eggs selected for incubation should be of average size and normal shape for the breed
- Further, the eggs should have a smooth un-cracked shell. If there are cracks in the shell, the loss of moisture from the egg can be too high and the embryo may die
- There is also a risk of bacteria entering the egg, which may lead to unhealthy or dead embryos
- Store the eggs in a cool and humid place until incubation, for example in a box in a hole in the floor of the coolest part of the house
- Eggs for sale may also be stored in the same place. During incubation you should always check, which eggs are fertile and which are non-fertile
- Fertile eggs very quickly develop blood vessels, which may be seen against a sharp light from a torch
- A broody hen should be separated from the flock to prevent other hens from disturbing her
- Keep the hen in a separate nest with free access to fresh water and feed within a short distance Provide the hen with a brooding nest or basket big enough to contain all her eggs
- Put fresh hay or straw in the nest and add some ash to prevent parasites
- In the dry and hot season, you may spray the breast of the hen with water to increase the humidity around the eggs
- The hen will do the work of hatching perfectly if she has the right conditions, for example a clean and suitable nest and quiet surroundings
- If only small quantities of chicks are to be hatched, a free-range hen is a better brooder than an artificial incubator, as she will normally have a higher rate of hatching (80-100%) than an incubator (60-80%)
- After hatching and until the chicks are old enough to be on their own, usually around 4 weeks of age, the hen will directly protect the chickens from adverse weather conditions and predators by covering them with her wings
- Indirectly, the hen will protect the newly hatched chicks against diseases for the first two weeks; and slowly transfer her natural behavior to the chicks
- Natural behavior means knowing how to search for food and water; which feed to take and which to avoid, how to avoid predators by hiding or seeking shelter in bushes and trees, how to keep healthy by dust bathing,

2.6 Ten simple rules for better management

- Provide simple houses or shelters and perches inside houses
- Use day shelters (basket) during day and night shelter (basket) during night;
- Give unlimited access to clean water;
- Separate young chicks from adults, when they are fed;
- Control the birds' health daily;
- Apply vaccines regularly according to the advice of local vaccinators or veterinarians;
- Isolate a bird when it becomes ill, - call the veterinary assistant or kill the bird;
- Kill or sell non-productive birds, i.e. cockerels and old hens that have stopped laying;
- Provide nests, and control nests for eggs two times a day;
- Check the reproduction status of each hen once a month, and give extra care to hens that are brooding

Scientific studies indicated that a simple management improvement on village poultry can maximize production and productivity. Below (Table-1) shows how poultry egg production and number of live bird increased along with management betterment.

Table 1**:** The effect of rural poultry improvement on production, reproduction and off-take per hen/year

Production system	**N° of eggs/hen/year**	**N° of year-old chickens**	**N° of eggs for consumption and sale**
Traditional	20 - 30	2 - 3	0
Step 0: Scavenging: no regular water or feed, poor night shelter			
Improved Traditional	40 - 60	4 - 8	10 - 20
Step 1: offered water and supplementary feed, improved shelter, care in first weeks, ND vaccination			
Step 2: as in step 1 plus further feeding, watering, housing; treatment for parasites, additional vaccinations	100	10 - 12	30 - 50
Step 3: (semi-intensive) as in step 2 with improved breeds and complete diets	160 - 180	25 - 30	50 - 60
Source: http://www.fao.org/docrep/008/y5169e/y5169e0b.htm			

HOUSING

Housing is essential to protect against predators, thieves, rough weather (rain, sun, very cold winds, dropping night temperatures) and to provide shelter for egg laying and broody hens. A suitable or comfortable poultry house is also important for efficient production and convenience of the poultry farmer.

- Depending on availability of materials, weather, and tradition you will find different types of poultry houses and shelters in tropical regions
- Choice of chicken house should be built upon a rationale involving an estimate of the costs, the durability, and immediate gain of using a house for the poultry

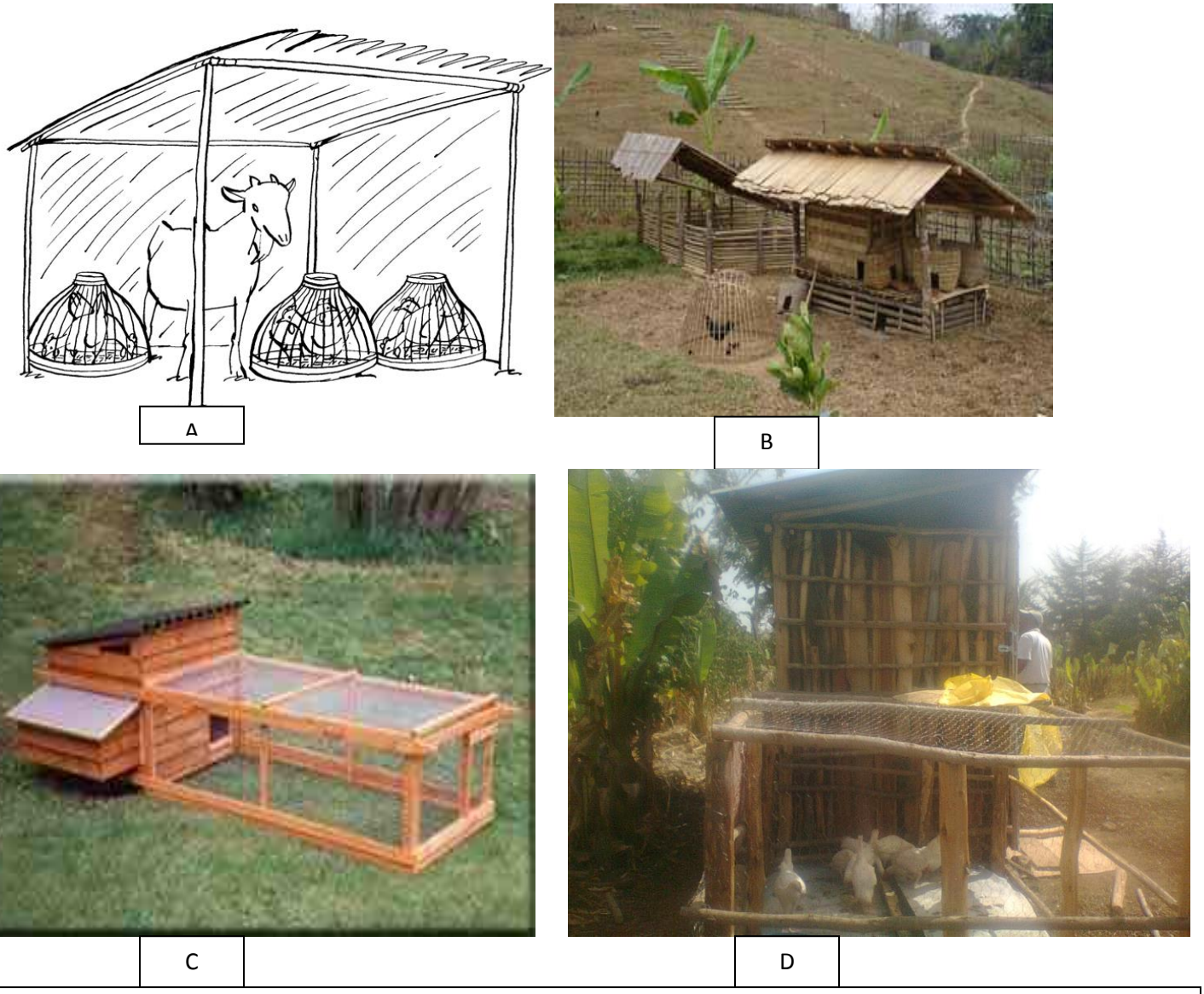


Fig. 7: Choice of chicken house: (A) night baskets kept in the stable during night; (B) day basket in the stable during daytime; (C) fabricated-wooden, wire mesh and iron sheet made house containing day and night shelter and (D) wood, wire mesh, mud and iron sheet made chicken house with day and night care shelter

When choosing the right site for chicken house construction, you should consider:

- A shady and dry place on flat ground to keep the floor dry during the rainy season
- It may be necessary to dig a drain around the house, or to raise the ground first
- Alternatively the house can be elevated from the ground
- A fertile well-drained soil is desired. The area must not get flooded during heavy rains
- Furthermore it is very detrimental to have wet floors in a chicken house, it leads to many diseases
- Trees and bushes close to the houses provide shade and are therefore beneficial
- Trees serve as a windbreak in the winter and for shade in the summer and protect from flying predators
- It is also for security reasons important to have the chicken house near the house
- The orientation of a chicken house has to take into consideration the movement of the sun and the dominating winds, making the house naturally shaded and ventilated at certain times of the day

3.1. Building the chicken house

- Always use cheap local materials like bamboo, wood, reeds, thatch grass, or clay bricks.
- Remove the bark from the wood you use, as parasites often hide behind the bark
- Chicken houses should have windows
- A hole in the top of the house may ensure good ventilation
- These measures will also give light, making it easier to work in the house. However, make sure winds will ventilate the house without making chickens or hens cold
- Placing perches and nests inside the house will safeguard against most predators
- It will also help to keep the legs of the chickens and the eggs clean
- Make the nests and perches easy to remove when cleaning
- Houses or shelters may be sprayed or lime washed after cleaning to disinfect and kill parasite eggs from the walls and cracks
- You may put some ashes on the floor and in the nests to discourage parasites
- Clear the grass and bushes for about 3 meters on all sides of the house to keep snakes and rats away from your chickens
- The house has to be so large that there is sufficient room for the birds, and so that the air inside does not become too heavy with humidity and gasses
- A round or square house of 1.5-2.0 m^2 will hold 10-12 adult birds

3.2. Perches

- Perches are important for chickens to rest during night
- Diseases and parasites may attack poultry resting on the floor, and perches often reduce the risk of external parasites entering the feathers at night
- Each one-meter perch may roost five adult birds. Perches are best made of bamboo or round sticks to accommodate for the size and structure of the birds' feet
- If the sticks are too big or too small, the birds may fall

- To prevent attack of external parasites, the perches may be treated with oil or kerosene, where the perch meets the wall

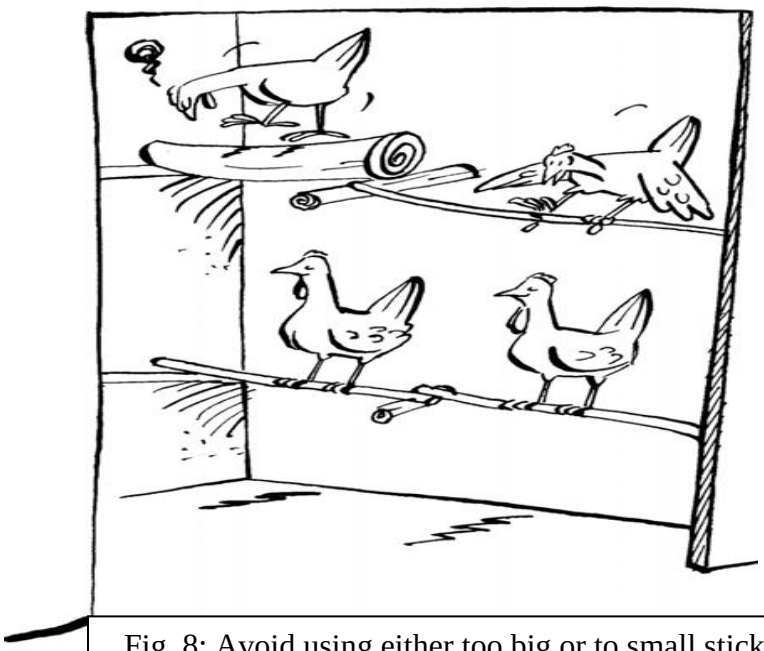


Fig. 8: Avoid using either too big or to small sticks as perches

Fig. 9: Sticks should match the size of the birds' feet

3.3. Nests

- In many villages, nests are not provided for the hens and eventually the hens will lay their eggs on the ground, in high grass or in natural shelters, where they may be difficult to find
- Some poultry farmers build nests on the ground outside the chicken houses
- This should be avoided, as eggs outside houses are more exposed to predators and thieves
- Nests should be placed inside the chicken house and preferably above the ground. For laying you may have a battery of nests where more hens can lay at a time

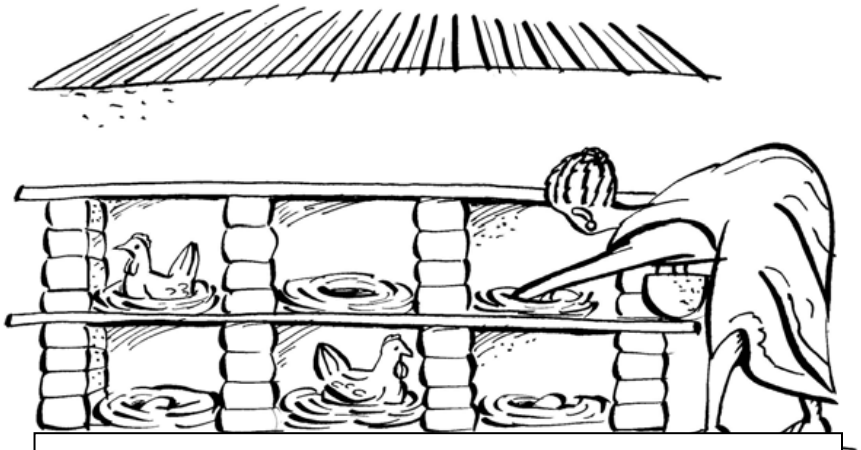


Fig. 10: Battery of nests' for laying hens

- There must be 1 nest for every 5 hens
- Nests should be of the right size for the hen to feel comfortable. A nest box will typically measure 30 x 30 x 30 cm
- Don't make them too big, as the hen will not feel comfortable
- A healthy and attractive nest for the broody hen may be prepared by following three steps
    1. Make sure that the pot or basket is clean and dry;
    2. Fill sand mixed with ashes up to 1/3 of the depth;
    3. Put clean, soft nesting material (hay or straw) on top up to 2/3 of the depth

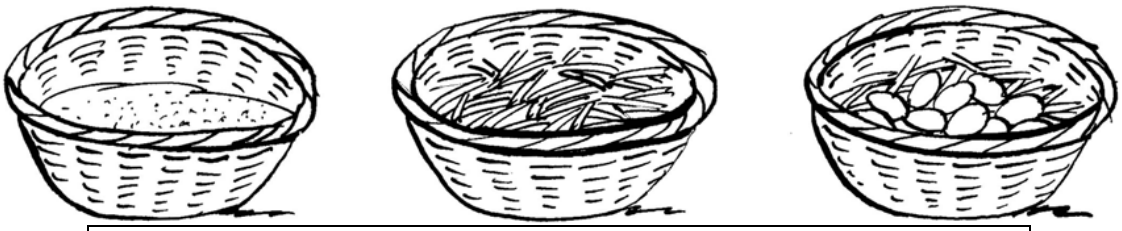


Fig. 11: Three steps in preparing a nest

- Nesting material should be changed at least once a week

- Mixing ashes, tobacco leaves or other anti-parasitic substances with the nesting material will keep out most external parasites
- External parasites in nests may reduce the hatchability of eggs, as the hen will use too much time and energy leaving the nest, cleaning and scratching her body, leaving the eggs cold

3.4. Ten simple rules for good housing

- Use baskets for night shelter and day shelter for small chicks to reduce costs and labour involved;
- Always use local materials to reduce costs;
- In wooden houses, use slatted, raised floors to remove droppings and avoid predators;
- In clay houses, use wire netting for the windows to keep out predators;
- Place the perches and nests inside the house, and make them removable to facilitate cleaning;
- Make sure winds will ventilate the house without making chickens or hens cold;
- Consider heavy rains and hot sun when placing the house or shelter.
- Provide nests with clean straw, which are easy to access, clean an move.
- Always house young chicks with their mother away from other adults.
- Make sure that houses are easy to access and clean

FEED AND FEEDING

Feeding is essential if you want to increase the production of meat and eggs from poultry. Even small flocks will eventually starve during certain periods of the year, if they are fed only leftovers and feed, they find by scavenging. Lack of feed or water will reduce the birds' resistance to diseases and parasites, and subsequently increase flock mortality.

The composition and availability of feeds will vary, depending on the season, site location and farming systems. In general, poultry, as other animals, need feed containing energy and protein, as well as vitamins and minerals. The need for feed will change, depending on the age and status (chicken, grower, egg layer, broody hen) of the bird. The cheapest – and also often the best – way to supplement the diet of your poultry, is to use local resources.

If your production is based on improved breeds for egg production, different types of commercial diets may be given: usually they are divided into three distinct categories, with decreasing amount of protein, e.g:

1. A starters' diet: high in protein; from hatch up to 4 to 6 weeks of age;
2. A growers' diet: medium in protein; up to 20 weeks;
3. A layers' diet: lower in protein; hens from 20 weeks

4.1. Scavenging

- In a free-range or improved free-range poultry rearing system, adult hens and cocks should always be given enough time and space for finding feed in the surroundings (scavenging)
- Small chicks should be kept in confinement for the first 4-6 weeks
- The best time for scavenging is early morning and late afternoon, as there are most insects and less heat
- The best time for giving supplementary feed will be in the morning and in the evening, when the birds come back to the house

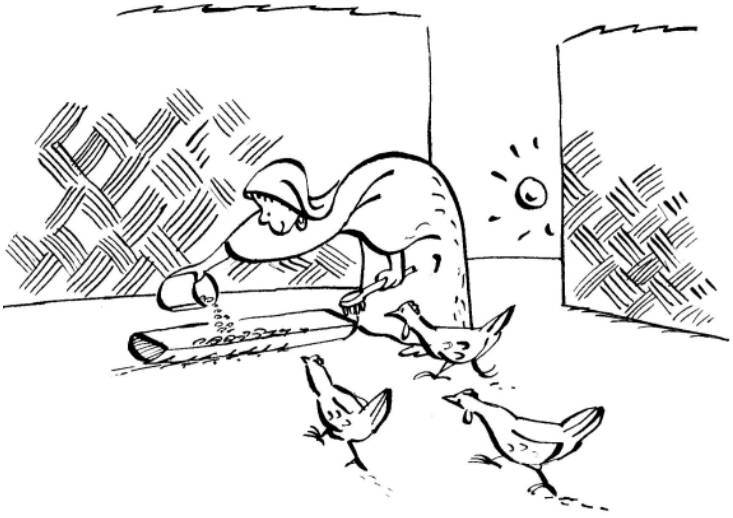


Fig. 12: Supplementary feeding and water is essential to increase production

- Drinker should always be filled with water so that chicken can consume as to their choice (ad-libitum) during the day to avoid heat stress

4.2. Supplementary feeding

- In general, poultry, like other animals, need feed containing energy and protein, as well as vitamins and minerals
- The need for feed will change, depending on the age and status of the bird (chicks, growers, egg layers, brooding hens) and of the purpose of the production (meat or eggs)
- Knowledge of the quality and source of different feedstuffs is thus important to reduce the risk of inappropriate feeding
- If the birds are fed fully on pre-mixed feed, feed should be available all day together with free access to clean water
- The feed will, depending on type, contain more or less energy and protein, as well as vitamins and minerals

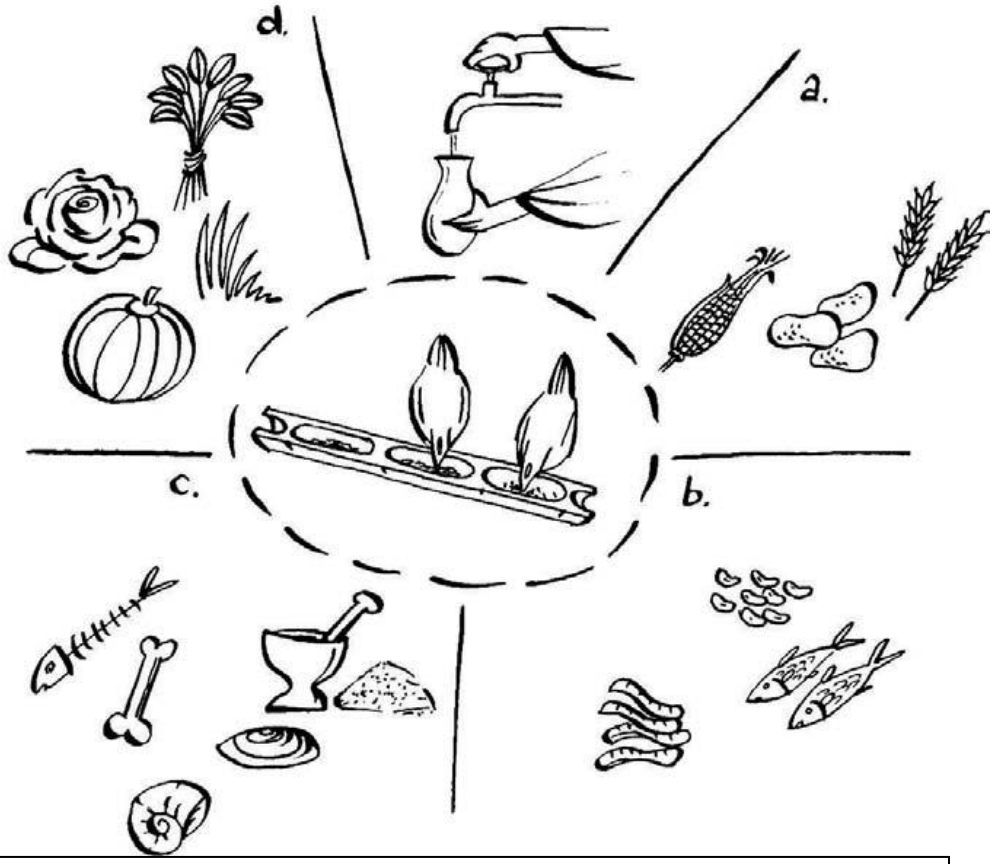


Fig. 13: Feed types split into sources of a) energy, b) proteins, c) minerals, d) vitamins

4.2.1. Energy rich-feed

- Normally, at least ¾ of a poultry diet consists of energy feeds
- Energy feeds are the most important nutrient to maintain body temperature and exercise levels of the birds
- Cereals, grain, roots, and tubers are the most important energy feeds
- Examples of energy feeds are cereals like maize (corn) and its by-products (bran), sorghum, wheat and its by-products (bran, shorts, screenings), rice and its by-products (bran, polishing), cassava root meal (farina, tapioca), yam meal, yucca meal, sweet potato meal, plantain and banana meal
- Roots and tubers should be soaked in water for 60 minutes or cooked before drying to remove harmful substances, and the proportion in the diet in general must be kept below 1/10 (Example 1 kg out of 10kg feed)

4.2.2. Protein-rich feeds

- Protein is needed for growth, egg production, and for keeping up a good health status
- Normally no more than 1/5 of a diet is protein-rich feeds
- Protein may come from either animal sources or plants
- Examples of protein-rich local feeds are: maggots, termites, termite eggs, insects, worms, meat scraps, fish scraps, fish meal, meat meal, bone meal, blood meal, leucaena, cassava leaves, feather meal, peas, beans, and oil cakes from e.g. ground nuts, cotton seed cake and sunflower cakes
- Harmful substances are present in some protein-rich plants, e.g. beans and cotton seed cakes (if not heat processed), and the proportion in the diet should thus be kept low
- The level depends on the type of plant, and whether the feed is being treated before feeding
- Oil cakes may contain much fibre and oil and should therefore be given in limited amounts to young chickens (less than 1/5-1/10 of the diet)

2.2.2.1. Simple techniques for growing maggots and termites

- Maggots and termites are excellent and cheap sources of protein in the improved free-range systems
- However, they will only be a supplement to other feeds
- Give the maggots or termites to the small chicks, as they have the biggest need for a good protein source
- Maggots may be grown by a simple technique and used to supplement the diet of the young chicks
- Blood, offal, and cow manure are mixed in a large open pot. The pot is filled with 1/3 water
- Flies will lay their eggs in the mixture, and the maggots will feed on it
- Leave the pot open during daytime and closed during the night
- After 5-10 days (depending on temperature), when the maggots are ready to pupae, you collect the maggots by gently pouring water into the pot
- The maggots will float and you can then wash them, and feed them directly to the birds

- Remember to place the pot away from public places, as the smell at times may be offensive

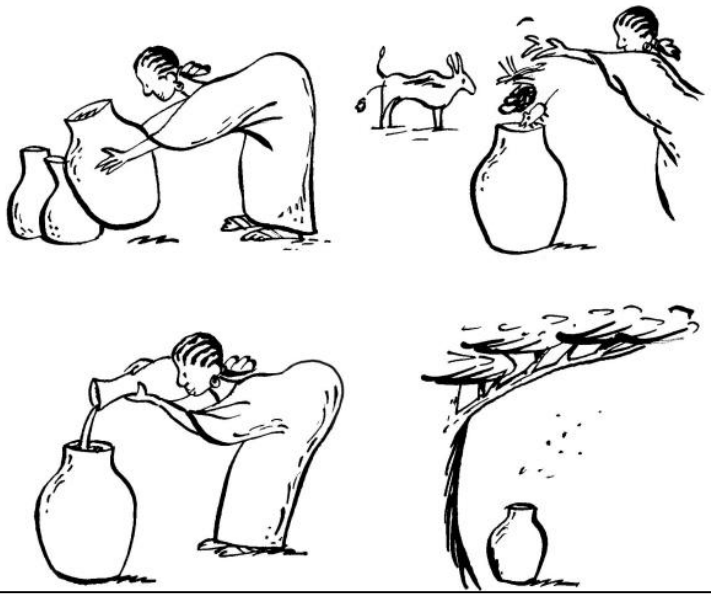


Fig. 15: Growing maggots

4.2.3 Mineral-rich feeds

- Minerals are important for bone formation, eggshell formation, and for a good health status
- To produce strong shells for their eggs, laying hens need free access to calcium (limestone or crushed shells)
- Adult birds are usually able to balance their intake according to needs
- If a phosphorous rich feed is added, it should be balanced with calcium, since too high levels of one may cause deficiency of the other
- Examples of sources for minerals are: bone meal, crushed oyster shells, snail shells, and burned eggshells
- Using bone meal or eggshells is a good way to supply calcium and phosphorus
- Eggshells should always be scorched or cooked before re-use in diets to remove any disease germs

4.2.4. Vitamin-rich feeds

- Scavenging birds get vitamins by eating green grass, vegetables, fresh cow dung, and through sunlight
- Confined birds always need additional vitamins mixed into their feeds or as a minimum given some green grass, vegetables and some fresh cow dung
- Remember to place the pot away from public places, as the smell at times may be offensive

4.3. How much to feed?

- Depending on the season, chickens may find nearly all they need in the surroundings (e.g. during harvest or rainy season) or close to nothing (during dry and lean season)
- In the free-range systems, the economic advantage is based on the fact that the poultry find most of their feeds when scavenging in the surroundings
- This will give an idea of what the chickens should be supplemented with during a particular season

Table 2: Supplement requirement and total feed requirement at different ages

Age, weeks	Approximate amount required per day per confined bird (g. dry weight)	Approximate amount of supplementary feed given to a scavenging bird per day (g. dry weight)
Week 1	12-15	10 - 15
Week 2	15 – 21	15 – 20
Week 3	21 – 35	21 – 30
Week 4 to 7	35-50	30-40
Week 8	55-60	30-40
Weeks 9-27 (grower)	65-80	30-50
>28 weeks (Adult)	100-150 depending on the size of the bird	30-50

- From hatch to the age of 4 to 6 weeks, the small chicks should receive full feed according to their needs
- In general, from week 4-6 and onwards the farmer should give maximum 30-40 g/bird/day, gradually reducing the amount of supplementary feed, until they only get between 1/3 and half of their needs as adults
- It is advisable to make a semi-balanced diet for the small chicks from 0-6 weeks of age
- Locally available ingredients should be dried in the shade (the sun may destroy important vitamins) and grounded in a mortar before mixing

4.4. How much to drink?

- Remember always to give free access to water
- But for estimate of the chicken daily water consumption you can refer table 3 below

Table 3: Chicken daily water requirement

Age (weeks)	Chicken water requirement/100 chicken (liter/day)
0-2	4-5
2-5	7-10
5-10	15
10-20	18
Adult	20-30

4.5. Simple feed mixing

- It is advisable to make a semi-balanced diet for the small chicks from 0-6 weeks of age
- Locally available ingredients should be dried in the shade (the sun may destroy important vitamins) and grounded in a mortar before mixing
- Locally available containers such as tomato tins or matchboxes may be used for easy quantification of the different ingredients
- Grams or percentages should be transferred into local quantities for field practice (like a tin of 1 liter almost equivalent to 1 kg of poultry feed)
- Large ready-mixed quantities should only be stored, if adequate storage capacities are assured
- In general you should not store mixed feed not more than 3 months to avoid contamination from mould, bacteria or rodents
- You will need a well ventilated, cool, dry shed or similar to store mixed feed.
- To prevent the feed from absorbing moisture, it should not be stored on a cold concrete floor, even if it is a dry floor because it will absorb moisture from condensation
- Using a wooden pallet is the preferred method of storing bags of feed but you can improvise using some pieces of wood if you can't get hold of one. This allows air to circulate underneath them and prevents the condensation problem
- Rats and mice will soon eat their way through your precious supplies so if you can, ensure rats cannot get into the storage area and if mice can get in, leave traps set nearby and check them regularly

Table 3: Simple ration for supplementing local chicken age 0-6 weeks (total 930 g)

Ingredient	Quantity
Crushed sorghum/millet grain or maize	1 tin can (1 kg tomato tin)
Wheat bran, sorghum bran or millet bran	1 tin can
Groundnut or sesame oil cake	2 match boxes
Sea shell or bone meal/salt mix	1 match box (1 salt with 13 bone meal)
Fish or blood meal	2 match boxes
Sesbania leaves	2 match boxes

4.6. Mixing and formulating feeds

- Mixing and formulating poultry feeds may be based on simple assumptions about the nutritional requirements of the birds and the content of the feedstuffs

Egg Layers (egg type breed) feed formulation (Table 4-6) and broilers (meat type) feed formulation table 7 & 8 below

Table 4: Starter ration formulation options for egg laying chicken

Feed Source	Starter feed (0-8 Weeks)								
	1	2	3	4	5	6	7	8	9
Maize	50	50	50	37	30	26	49	44	30
Wheat middling (Furshkelo)	25	29	29	18	19	27	9	10	20
Bone and meat	4	4	4	6	10	10	7	--	--
Nuag cake	20	--	--	35	15	13	24	--	--
Rape seed cake	--	16	--	--	--	--	--	--	--
Cotton seed cake	--	--	16	--	--	--	--	--	--
Salt	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Vitamins and minerals premix	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Limestone	--	--	--	--	--	--	--	1	1
Bone meal	--	--	--	3	--	--	--	2	2
Sorghum	--	--	--	--	25	23	--	--	14
Brewery residue	--	--	--	--	--	--	--	--	--
Brewery malt byproduct	--	--	--	--	--	--	10	--	--
Alfalfa	--	--	--	--	--	--	--	5	5
Groundnut cake	--	--	--	--	--	--	--	20	20
Meat meal	--	--	--	--	--	--	--	4	4
Fish meal	--	--	--	--	--	--	--	3	3
Barely	--	--	--	--	--	--	--	10	--
Total	100	100	100	100	100	100	100	100	100

Table 5*: *Grower ration formulation options for egg laying chicken

Feed Source	Growers feed (8-18 weeks)				
	1	2	3	4	5
Maize	48	42	49	42	32
Wheat middling (Furshkelo)	23	--	10	16	22
Bone and meat	5	--	--	5	--
Nuag cake	21	35	--	33	--
Rape seed cake	--	--	--	--	--
Cotton seed cake	--	--	--	--	--
Salt	0.5	0.5	0.5	0.5	0.5
Vitamins and minerals premix	0.5	0.5	0.5	0.5	0.5
Limestone	2	2	--	1	1
Bone meal	--	--	1	2	2
Sorghum	--	--	2	--	15
Brewery residue	--	15	--	--	--
Brewery malt byproduct	--	--	--	--	--
Alfalfa	--	5	5	--	5
Groundnut cake	--	--	15	--	15
Meat meal	--	--	4	--	4
Fish meal	--	--	3	--	3
Barely	--	--	10	--	--
Total	100	100	100	100	100

***Table 6**: Layers' ration formulation options for egg laying chicken*

Feed Source	Starter feed (>18 Weeks)								
	1	2	3	4	5	6	7	8	9
Maize	40	37	40	45	48	40	25	36	51
Wheat middling (Furshkelo)	--	18	32	23	26	10	14	20	10
Bone and meat	--	9	5	8	5.5	10	7	--	--
Nuag cake	37	30	18.5	18	15	11	20	--	10
Rape seed cake	--	--	--	--	--	--	--	--	--
Cotton seed cake	--	--	--	--	--	--	--	--	--
Salt	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Vitamins and minerals premix	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Limestone	2	1	3.5	--	4.5	3	3	3	3
Bone meal	--	4	--	5	--	--	--	3.5	3.5
Sorghum	--	--	--	--	--	--	30	16	--
Brewery residue	15	--	--	--	--	--	--	--	--
Brewery malt byproduct	--	--	--	--	--	--	--	--	--
Alfalfa	5	--	--	--	--	--	--	4	4
Groundnut cake	--	--	--	--	--	--	--	10	--
Meat meal	--	--	--	--	--	--	--	3.5	4.5
Fish meal	--	--	--	--	--	--	--	3	3
Barely	--	--	--	--	--	--	--	10	10
Total	100	100	100	100	100	100	100	100	100

Table 7: Starter feed formulation option for broilers

Feed Source	Starter feed (0-4 weeks)						
	1	2	3	4	5	6	7
Maize	44	40	29	45	47	47	45
Wheat middling (Furshkelo)	10	12	22	13	8	8	15
Bone and meat	13	14	12	12	6	--	10
Nuag cake	32	--	--	--	33.5	33.5	15
Rape seed cake	--	--	--	29	--	--	--
Cotton seed cake	--	33	--	--	--	--	--
Sunflower seed cake	--	--	36	--	--	--	--
Salt	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Vitamins and minerals premix	0.5	0.5	0.5	0.5	2	2	0.5
Blood meal	--	--	--	--	3	6	--
Bone meal	--	--	--	--	--	3	--
Wheat screenings	-	-	-	-	-	-	9
Fish meal	-	-	-	-	-	-	5
Total	100	100	100	100	100	100	100

Table 8: Finisher feed formulation option for broilers

Feed Source	Finisher feed (4-8 weeks)						
	1	2	3	4	5	6	7
Maize	53	53	45	55	64	65	50
Wheat middling (Furshkelo)	7	6	12	7	22.5	22.5	11
Bone and meat	10	10	10	10	5	2	10
Nuag cake	29	--	--	--	--	--	18
Rape seed cake	--	--	--	27	--	--	--
Cotton seed cake	--	30	--	--	--	--	--
Sunflower seed cake	--	--	32	--	--	--	--
Salt	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Vitamins and minerals premix	0.5	0.5	0.5	0.5	2	2	0.5
Blood meal	--	--	--	--	3	6	--
Bone meal	--	--	--	--	3	2	--
Wheat screenings	-		-	-	-	-	10
Fish meal	-	-	-	-	-	-	
Total	100	100	100	100	100	100	100

4.7. ***Feeders and drinkers***

- Feeders and drinkers should always be kept clean to prevent spread of diseases
- They should be big enough for all birds of the same age to feed at the same time
- One metre trough or a 35 cm (diameter) tube feeder is big enough for 20 adult birds to eat and for 40 to drink

Table 9: Chicken feeder space requirement

Age (weeks)	Feeder design and feeding space requirement (cm)	
	Rectangular	Round
0-6	4	1.5
6-18	8	3
>18	10	4

- Feeders and drinkers may easily be produced out of local materials
- Placed feeder and or drinker low enough for small birds to drink, but also high enough for adult birds to dip their wattles to keep them cool during hot weather
- Usually several waterers in different sizes should be applied
- It is important that the feeders are constructed in such a way that feed waste is avoided
- Also feed waste can be decreased if feeders are not filled to the top
- It is better to fill feeders just half full and then check them regularly for refills

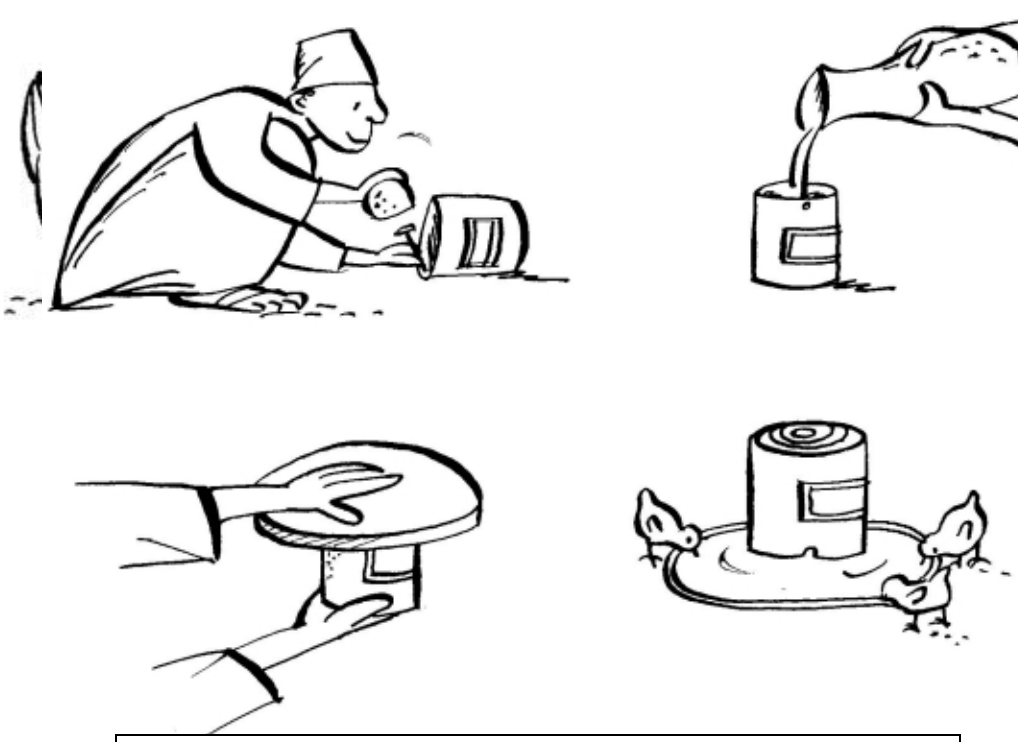


Fig. 16: Simple drinker made of an old tin can and a plate

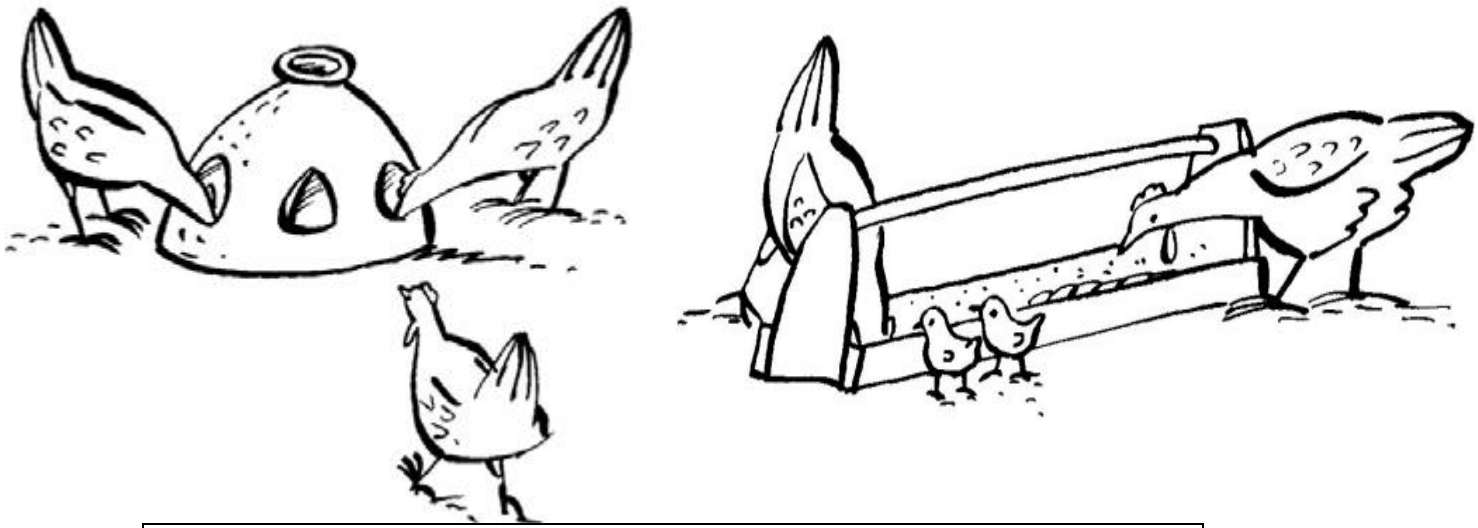


Fig. 17: Feeders and drinkers may also be made locally of wood, clay, or metal

4.8. Twelve simple rules for feed management

Before buying, mixing, and storing feeds, it is important to understand some underlying principles of good feed management

It is crucial to:

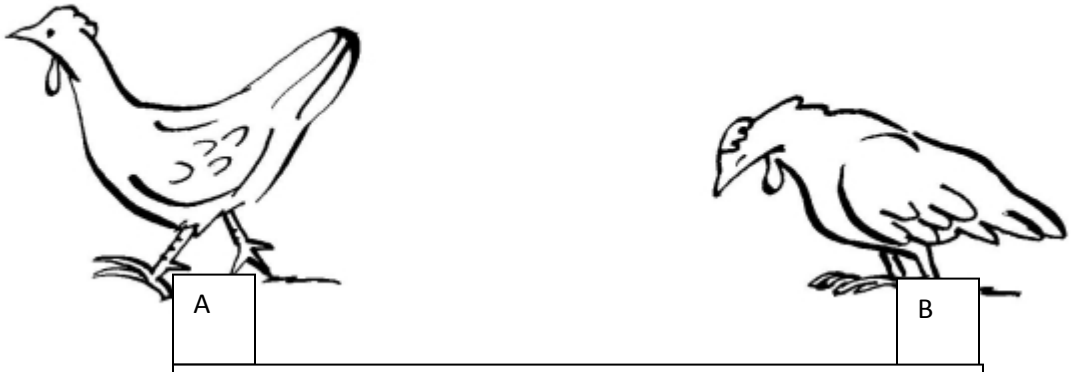
1. Use local feed ingredients for local birds;
2. Know the quality or feed value, and changing prices of each feed ingredient;
3. Buy missing feed ingredients, such as vitamins or protein sources locally;
4. Change the feed formulation depending on availability, quality or feed value, and changing prices
5. Reduce the flock size in free-range systems during lean seasons and if the feed becomes too costly;
6. If you change feed and feeding level, always do it slow and gradual
7. Mix feed ingredients uniformly in relatively small quantities to avoid too long storage time;
8. Use locally available materials such as tomato tins or matchboxes for quantifying the different ingredients to be mixed. Grams or percentages do not work in practice;
9. Store mixed feed or feed ingredients separately upon a platform approx. 30 cm above the floor;
10. Stop the entry of rats, pigeons, or other type of birds into the feed store room;
11. Make sufficient ventilation of air so that the feed ingredients are not wet due to humidity;
12. Be careful that feed ingredients, which are mouldy, discolored or from which pests have eaten, are not used

DISEASES AND HEALTH MANAGEMENT

Diseases are everywhere and will attack birds at all ages, but careful management will prevent many diseases. One sick hen is isolated in a small shelter away from the others. Birds are well fed and characteristically healthy.

5.1. Healthy and unhealthy birds

- It is very important for the farmer to learn how to detect an unhealthy or sick bird, so he can initiate the right action
- Healthy birds may be able to fight against the diseases themselves whereas unhealthy birds will have difficulties in fighting diseases
- It is important to isolate unhealthy or sick birds from the healthy flock in order to ensure a minimum of loss



Healthy birds (A) and unhealthy/sick birds (B)

Characteristics	
Healthy	Unhealthy
◆ Alert and on guard ◆ Bright eyes and comb ◆ Walk, run, stand, and scratch continuously ◆ Eat and drink normally ◆ Lay eggs normally ◆ smooth and neat feathers ◆ Soft compact droppings ◆ Breathe quietly	◆ Tired and lifeless ◆ Dull eyes and comb ◆ Sit or lie down ◆ Eat and drink less ◆ Lay less or stop laying eggs ◆ Ruffled and loose feathers ◆ Wet droppings with blood or worms, diarrhea ◆ Cough, sneeze and breathe noisily

- If you find an unhealthy or sick bird, isolate the animal and call for the veterinarian or health assistant for disease identification and further advice
- If the bird dies, burn it or bury it. You should remove dead birds, so that the germs are not left on the ground to be passed on to the other birds

5.2. Case Definition of economically important poultry diseases in Ethiopia

5.2.1. Newcastle Disease (ND)

The disease is very common during dry seasons, and is often seen in young chicks, but also in adults. The disease is a virus, so there is no treatment, but it may be prevented through vaccination of all birds including chicks from two weeks of age.

Clinical case sample pictures	Clinical Sign
	◆ Newcastle disease causes high mortality with depression and death in 3 to 5 days as major signs ◆ Affected chickens do not always exhibit respiratory or nervous signs ◆ Show heavy breathing, greenish droppings, and sometimes bloody diarrhea ◆ Labored breathing with wheezing and gurgling, accompanied by nervous signs, such as paralysis or twisted necks (torticollis) are the main signs ◆ Egg production will decrease 30 to 50% or more, returning to normal levels in about 2 weeks ◆ Eggs may have thin shells and eggs without shells may also be found ◆ In well-vaccinated chicken flocks clinical signs may be difficult to find ◆ Inflamed tracheas, pneumonia, and/or froth in the air sacs are the main lesions
Transmission	**Treatment and Control**
◆ Newcastle disease virus is highly contagious through infected droppings and respiratory discharge between birds ◆ Spread between farms is by infected equipment, trucks, personnel, wild birds or air The incubation period is variable but usually about 3 to 6 days	◆ There is no treatment for Newcastle disease ◆ Vaccination against ND with live and/or inactivated (killed) adjuvant vaccines is the only reliable control method

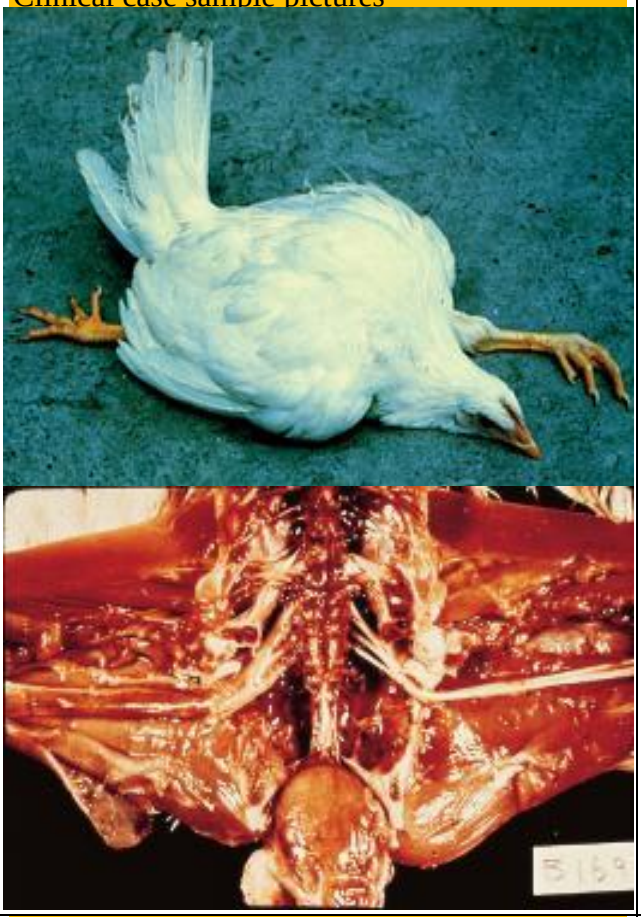
5.2.2. Fowl pox

Often it is seen in young chicks, but also in adults, and shows as pocks (small lumps) on wattles, comb and face. High body temperature, tiredness followed by sudden death. The disease is common during dry seasons, but may be found all year around. The disease is a virus, so there is no treatment. Vaccine is available and highly effective.

Clinical case sample pictures	Clinical Sign
	◆ The lesions of fowl pox can be external (mainly on the head) or internal ("wet pox") in the mouth, oesophagus and/or trachea, they can also be found on other parts of the body (skin of legs, cloaca etc.) ◆ The lesions on the head, combs, and wattles are usually wart-like in appearance, yellow to dark brown in color ◆ The internal lesions in the mouth, oesophagus and/or trachea are yellow-white and cheesy in appearance ◆ Affected birds will be depressed, lack appetite and when "wet pox" is present they breath laboriously
Transmission	**Treatment and Control**
◆ Introduction of infected or "carrier" birds in a susceptible flock will cause an outbreak by direct contact and water or feed transmission ◆ Mosquitoes and other flying insects can also transmit the virus from bird to bird and also transmit the disease to nearby flocks ◆ The incubation period varies from 4 to 20 days	◆ It is difficult to treat affected birds ◆ Treatment of local lesions with disinfectant ◆ Preventive vaccination using a live vaccine is by far the most successful control method ◆ Even when an outbreak of fowl pox has been diagnosed, it is advisable to vaccinate the flock immediately to stop further spread of the infection

5.2.3. Marek´s disease (MD)

Only seen in birds older than 16 weeks. Initially the birds may show paralysis of one or both wings. Or one or both legs might be paralysed. The disease is a virus, so there is no treatment, but commercial vaccines are available.

Clinical case sample pictures	Clinical Sign
	◆ Infected birds show weight loss, or may exhibit some form of paralysis ◆ Mortality varies from 5 to 50 % in unvaccinated birds ◆ The classical form (paralysis) with leg nerve involvement causes a bird to lie on its side with one leg stretched forward and the other backward ◆ When the gizzard nerve is involved, the birds will have a very small gizzard and intestines and will waste away ◆ Mortality usually occurs between 10 and 20 weeks of age ◆ Nerve involvement, either grossly (swelling of leg, wing or other nerves) or microscopically, is typical of MD ◆ Skin involvement (skin leucosis) often consists of tumours of feather follicles or in between follicles
Transmission	**Treatment and Control**
◆ Main transmission is by infected premises, where day-old chicks will become infected by the oral and respiratory routes ◆ Dander from feather follicles of MD-infected chickens can remain infectious for more than a year ◆ Young chicks are particularly susceptible to horizontal transmission ◆ Susceptibility decreases rapidly after the first few days of age	◆ Vaccination of day-old chicks is an effective mean of control ◆ It has been demonstrated that MD vaccine only prevents the appearance of Marek's disease tumours and paralysis ◆ It does not prevent the birds from becoming infected with MD-virus ◆ It is therefore of major importance to maintain high hygienic and sanitary measures by good management to avoid early exposure of young chickens

5.2.4. Gumboro (Infectious Bursal Disease, IBD)

Gumboro is only seen in chicks younger than 6 weeks, and normally only in large flocks kept in confinement. Not common in small-scale village based systems. Common symptom: Diarrhea. The disease is a virus, so there is no treatment. Vaccine is available.

Clinical Case Sample Pictures

IBD infected chicken (right

Enlargement of the affected Bursa

Clinical Signs

- Clinical IBD occurs usually between 4 and 8 weeks of age
- Affected birds are listless and depressed, pale and huddling
- Mortality varies. Usually new cases of IBD have a mortality rate of about 5 to10% but can be as high as 60% depending on the severity of the strain involved
- In subsequent infection on the same farm, mortality is lower and eventually, with successive attacks, there is no mortality noted
- The subclinical form caused by the immunosuppressive effect of the IBD virus is now of more economic importance in that
- the immune system of the bird is damaged Gumboro disease related diseases such as inclusion body hepatitis are more frequent in these birds
- In broilers this form of the disease results in bad performance with lower weight gains and higher feed conversion ratios

Transmission

- IBD virus is very infectious and spreads easily from bird to bird by way of droppings
- Infected clothing and equipment are means of transmission between farms

Treatment and Control

- No treatment is available for IBD
- Vaccination of parent breeders and/or young chicks is the best means of control
- The induction of a high maternal immunity in the progeny of vaccinated breeders, together with the vaccination of the
- offspring is the most effective approach to successful IBD control

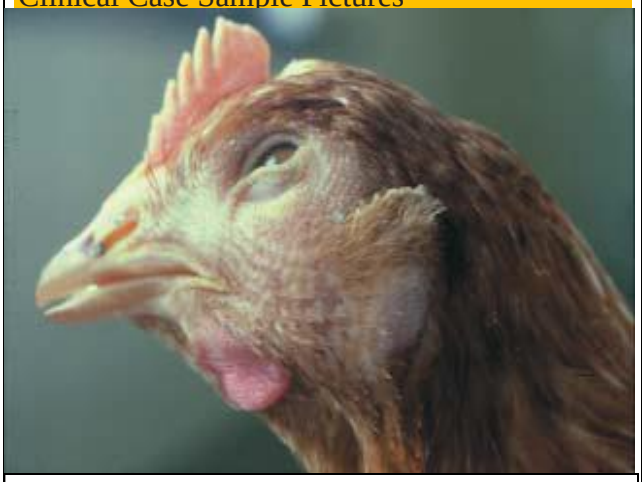
5.2.5. Infectious Bronchitis (IB)

Corona-virus is the causal agent. Several different serotypes of IB virus are known to exist. Only chickens are susceptible to IB virus.

Clinical Case Sample Pictures	Clinical Signs
	◆ In young chicks IB virus infection causes a unpleasant exudates in the bifurcation of the bronchi, thereby causing suffocation, preceded by severe respiratory distress ("pump handle" breathing) ◆ In older birds IB does not cause mortality ◆ Egg production will decrease dramatically, deformed eggs with wrinkled shells will often be laid ◆ Mucus and redness in tracheas, froth in airsacs in older chickens ◆ In young chicks a yellow cheesy plug at the tracheal bifurcation is indicative of IB infection
Transmission ◆ The virus is transmitted from bird to bird through the airborne route ◆ The virus can also be transmitted via the air ◆ between chicken houses and even from farm to farm	**Treatment and Control** ◆ There is no specific treatment for infectious bronchitis. Antibiotics given for 3-5 days may aid in combating secondary bacterial infections ◆ Baby chicks can be encouraged to eat by using a warm, moist mash. ◆ As IB infection tends to persist on a farm, depopulation is strongly recommended, followed by disinfection and resting of the pens ◆ An effective vaccination program should be introduced with the arrival of the next batch of chicks

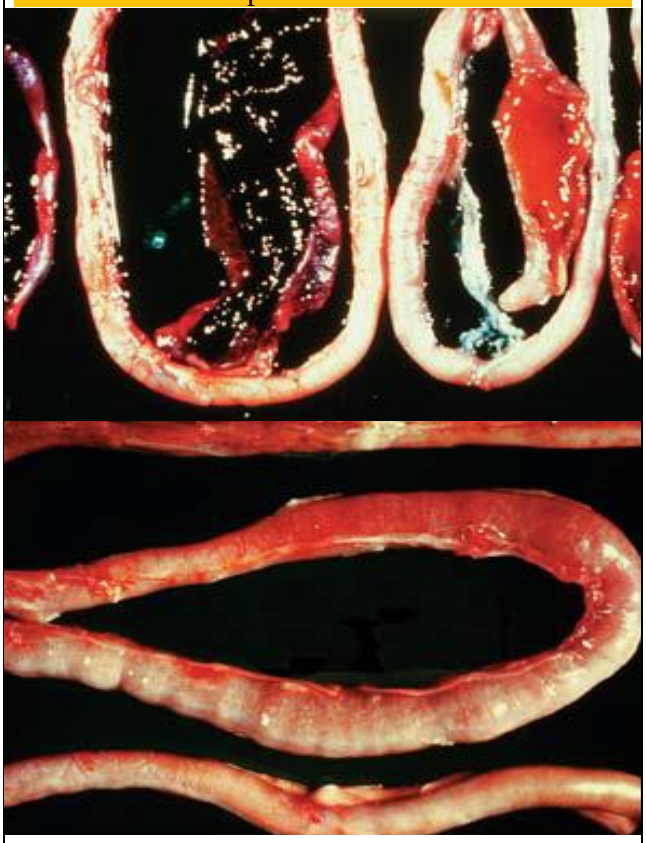
5.2.6. Infectious Coryza

The bacterium causing this disease is Hemophilus paragallinarum. Chickens appear to be the only natural hosts of the bacteria.

Clinical Case Sample Pictures	Clinical Sign
 Typical facial edema	◆ The main signs of the disease are inflammation of eyes and nose with foul-smelling discharges ◆ Conjunctivitis, sneezing and facial swellings ◆ Feed and water intake is reduced, leading to loss of weight ◆ Egg production in laying birds will drop ◆ Mortality will vary with the virulence of the infection but is generally low
Transmission	**Treatment and Control**
◆ The disease spreads from bird to bird and flock to flock by contact and airborne infected dust particles and via the drinking water ◆ Spread by equipment and personnel has also been reported ◆ The incubation period varies from 1 to 3 days	◆ Treatment with antibiotics can be given to subdue clinical infection, but eradication and prevention are the most desirable means of control of coryza ◆ Vaccines have been developed, but are only used in areas where the disease is endemic and cannot be eradicated

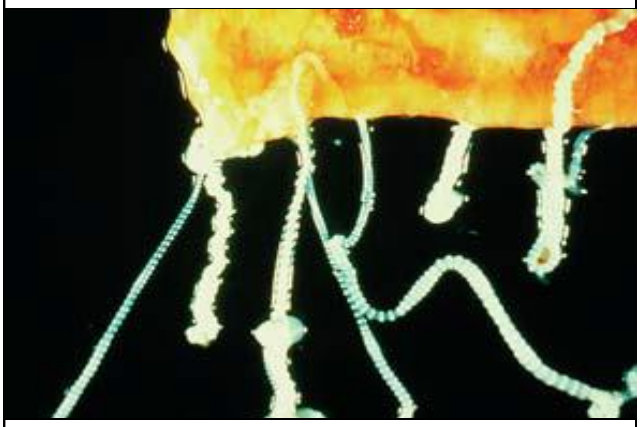
5.2.7. Coccidiosis (internal parasites)

Coccidiosis is caused by protozoa, unicellular parasites. Chickens have their own specific coccidiosis types which do not cross-infect other bird species. The disease may occur at any time at all ages, but can be prevented by regular and careful cleaning of troughs and poultry houses. If the chicks survive, they will remain thin and be late in laying. Avoid different age groups of birds in the same house, as the disease may spread from adults to young chicks.

Clinical case Sample Picture	Clinical Sign
	◆ Coccidiosis can be divided into 2 groups: ◆ The caecum is involved (Caecal coccidiosis) ◆ Mainly caused by E. tenella in chickens up to 12 weeks ◆ Mortality may run as high as 50 %. Infected birds are listless, have bloody droppings, a pale comb and show a lack of appetite ◆ Laboratory examination will show haemorrhages in the caecal wall ◆ After severe bleeding a core will be formed in ◆ the lumen ◆ The small intestine is involved (small intestinal coccidiosis) ◆ May affect birds of any age ◆ Birds infected show loss of weight, combs may be shriveled and a drop or even cessation of egg production in layers may be seen
Transmission	Treatment and Control
◆ Infected droppings, containing oocysts of coccidia are the main means of transmission, between birds ◆ The incubation period is 4 to 6 days	◆ The well established principles of good management and husbandry are of basic importance ◆ It is common practice to include low levels of chemotherapeutics in the feed of birds ◆ Treatment of infected flocks may be carried out by the administration of coccidiostats at a higher therapeutic level to the affected birds

5.2.8. Internal Parasites (Endoparasites)

Worms living in the intestines of chickens fall.

Clinical Case Sample Pictures	Clinical Signs
 Left round worms and right hair worms  Tapeworm	◆ Mature roundworms are not a major cause of the disease, but the larvae can damage the intestinal lining, causing enteritis, anaemia, decreased egg production and at times eggs with pale yolks ◆ Cause more damage to the intestinal lining and can cause enteritis and anaemia with decreased egg production and the appearance of pale egg yolks ("platinum yolks") ◆ Caecal worms are found in the caeca and do not cause serious damage, except that their eggs can transmit blackhead ◆ Tape worms are infrequently found and do not cause serious damage, except that they use the nutrients of the host
Transmission	**Treatment and Control**
◆ Internal parasites as found in the faeces and transmitted via contaminated feed, water and premises	◆ Internal parasites are very common in all ages in the village based production systems ◆ These parasites will cause poor health, weight loss, drop in egg production, and bloody diarrhea ◆ The best treatment is adding anthelmintics in the drinking water once or twice a year, at best two weeks before vaccination against ◆ ND ◆ Careful hygiene may prevent heavy infection

5.2.9. External parasites

Attacks all ages any time, but occurs more frequently in humid chicken houses with bad hygiene.. Lice can be seen around eyes and nose.

External Parasite Sample Pictures	Clinical Sign
Tick Flee Lice	◆ Adult birds are clearly disturbed and spend a lot of time pecking and polishing feathers Young chicks may die from anemia ◆ If not treated, mites, lice, fleas, ticks will cause weight loss and possibly loss of feathers due to the parasites sucking blood and to skin irritation ◆ Fleas can be seen on the belly
Transmission	**Treatment**
◆ Direct contact among chicken ◆ Contaminated premises	◆ Spray or dust with pesticides, ashes, and oil ◆ Ashes and sulphur powder may be used where the hens do dust bathing ◆ Nests may be protected by putting a few tobacco leaves mixed with ashes in the nests

5.3. Medication and vaccination

5.3.1. Medication

- Some diseases may be cured by drugs
- Parasitic diseases, such as lice, tick and fleas or worms can be cured by use of anti-parasitic drugs or by applying pesticides or simple methods such as baths in oil
- Bacterial diseases causing respiratory disorders or diarrhoea, can be cured with antibiotics
- For viral diseases there is no treatment
- But the viral diseases may often be prevented by vaccination

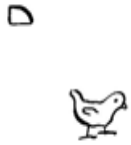
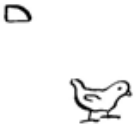
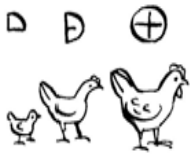
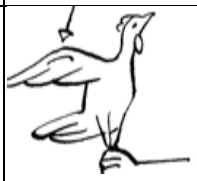
5.3.2. Vaccination

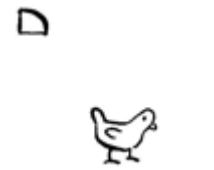
- All poultry should be vaccinated against the most common viral disease (s) in the area
- Vaccination schemes at village level should cover Newcastle Disease and Fowl Pox
- Other viral diseases such as Gumboro and Marek's disease may be covered by vaccination, but they are often less important at village level
- A bacterial disease such as Fowl cholera may also be prevented by vaccination
- Poultry should be vaccinated when they are very young, and before they have begun to lay eggs
- Most young birds that have not been vaccinated do not resist diseases, and often die
- Vaccines should only be given to healthy birds. If you vaccinate a sick bird you may kill the bird
- Anti-parasitic drugs against internal parasites should be given two weeks before vaccination, to improve the effect of the vaccine
- For scavenging poultry, you should avoid mixing vaccines with drinking water or feed, as it is difficult to give the right dose
- A too high dose of a live vaccine may kill a young chick, whereas a too low dose will not give adequate protection

5.3.3. Disease prevention calendar

- It is important to prevent and treat diseases according to the occurrence of diseases
- Vaccination campaigns against Newcastle Disease (ND) or Fowl Pox should be implemented before the onset of the disease, as the vaccine otherwise may kill already sick birds
- To plan vaccination and medication, it is advisable to use a so called "disease prevention calendar", where veterinarians, farmers and extension workers together identify the periods, where diseases should be prevented or treated

- The figures in table below shows “disease prevention calendar” indicating how chickens at different ages are vaccinated against ND and Fowl Pox and treated against internal parasites (worms) and external parasites following the annual cropping cycle and festivals

Vet service along cropping calendar / Disease type	Jan	Feb	Mar	April	May
ND					
Internal parasite					
Fowl pox					
External parasite					

Jun	Jul	Aug	Sep	Oct	Nov	Dec
						

5.3.4. Ten simple rules for disease prevention

1. Give access to the right feed and clean water, in particular for small chicks;
2. Build shelters against wind and rain;
3. Clean houses regularly and apply lime wash on the floor and the walls;
4. If necessary, provide dry litter regularly;
5. Do not put too many birds together;
6. Different species of poultry, for example hens, turkeys, pigeons, ducks and guinea fowls should be kept separate;
7. Separate chicks from adult birds except from the mother hen;
8. Vaccinate chicks against the most important diseases and revaccinate if necessary;
9. Isolate and treat sick birds – if medication is not available then kill the sick birds;
10. Burn or bury dead birds

PROFITABILITY AND MARKETING OF PRODUCTS

Before starting any production, it is important to know the market situation, the investment costs, running costs, and expected revenue for the different products. In general the economic outcome as well as the need for investments and the risk involved in the production, will be very different for improved free range systems (relatively low risk) and small-scale confined systems (higher risk).

6.1. Chicken for sale

- Cockerels should be sold as soon as they fetch a good price, as one cock to 10-15 hens is sufficient to produce fertile eggs
- In some cases, you may also want to sell a cock, if it is not doing a good job in mating
- At the age of 6 months and a weight of approximately 1 kg, cocks are usually big enough to be sold at the market
- Chickens should always be sold alive in the markets, but do not return live chickens from the market, if you does do not mix with others and keep separately for same days , as this is a major cause of transfer of diseases
- Old hens, which are no longer laying should also be sold
- When you want to catch the birds, you catch them in the house in the late evening during sleep, or attract them with feed

6.2. Eggs for sale

- Eggs should be collected and marketed while fresh, in particular if not cooled
- Collect eggs from the nesting boxes at least once, but rather two times a day, and store them in a dark and cool place
- Eggs should normally not be cleaned, but kept clean in the nests
- If they are dirty, clean the eggs with a clean, dry sponge or cloth, and sell the eggs immediately Cleaning eggs with water may disturb the natural protection of the shell and introduce infections to the egg
- Pack eggs in boxes, egg trays, or other suitable package, e.g. banana leaves
- Sell eggs in the market two to three times a week, so you get a good name for selling fresh eggs
- If profitable, grade your eggs according to size
- Always keep records of your production and sale, as explained below.

Table 10: Record keeping for small-scale chicken production: Animals

Production Record Name of farmer:		Week/Day: Family:	
Record	Number	Price	Comments
1. Hens			Health status, in lay?
2. Cocks			Health status,
3. Growers			Health status, age, weight
4. Chickens			Health status, age, weight
5. Dead birds			Cause of death
6. Eggs laid			
7. Fertile eggs incubated			
8. Chickens hatched			
9. Cocks sold			Where and to whom?
10. Hens sold			
11. Growers sold			
12. Chicks sold			
13. Eggs sold			To whom?
14. Eggs/Poultry consumed			
15. Poultry given as gifts			
16. Hens and Cocks vaccinated			What treatment/vaccine and how?
17. Growers/cockerels vaccinated			
18. Chickens vaccinated			
19. Birds given medicine			

Table 11: Record keeping for small-scale chicken production

Materials and feed

Name:			Day:
Record	Numbers	Price	Comments
Materials			
a. Baskets			
b. Shelters			
c. Chicken houses			
d. Nests			
e. Feeders			
f. Drinkers			
g. Other materials			Type, quantity
Feed			Type, quantity
h. Feed stuffs			
i. Formulated feeds			
j. Vitamins, minerals			
k. Medicine			

6.3. Cost benefit calculation

In order to calculate the profit in your enterprise, you should estimate costs and revenues on an annual basis. Tables 12 & 13 show examples of the information you need to make a simple cost-benefit analysis.

Table 12: Example of small-scale free-range system, 52 weeks plan

Flock size	Numbers
Local hens laying and brooding	3
Local hens laying eggs, not broody	2
Cocks	1
Surviving chickens/hen/batch*	8
Growers. Weeks 4-24	24
Total Flock size	30
Feed consumption: 1 Kg /bird/4 week =35 g/bird/day	Kg
Adults feed: 1 kg x 6 birds x 52/4 weeks	78
Chicken/growers feed: 1 kg x 24 birds x 46 /4 weeks	276
Egg Production:	Numbers
Local broody hens. 72 eggs/bird/year	216
Local hens not going broody. 104 eggs/bird/year	208
Eggs for hatching. 3 hens x 12 eggs x two batches /year	-72
Home consumption, 1.5 egg/week	-82
Saleable birds: 3 batches x 8 growers	Numbers
Cockerels. 22 weeks of age	24
Pullets for sale. 24 weeks of age	24

*(12 eggs laid=10 eggs hatched=8 chicks surviving after 6 months)

Table 13: Cost-benefit analysis based on example in table 12

Cost-benefit Analysis	Text	Cost/Unit	Cash flow
Costs		ETB*	ETB
5 hens and 1 cock	5 x 130 + 1 x 130		-780
Baskets, 3 night + 3 day baskets	6 baskets	40	-240
Low cost homemade feed	354 Kg	1750	-1750
Vaccine (ND)+medicine (Coc+anti-worm)	60 Doses/year	5	-180
Miscellaneous			-50
Cash out-flow			**-3000**
Income (Benefit)			
Sale of Eggs	424 – 154 = 270	3	810
Sale of cockerels, 22 weeks	24	100	2400
Sale of pullets, 24 weeks	24	100	2400
Total cash in-flow			5610
Net cash flow			**2611**

Key: Fixed costs of land and housing materials and labor as operating cost not included since it varies from place to place

6.4. Ten simple rules for marketing and financial analysis

- Analyze the market situation, demand for products, investment costs, running costs, and expected revenue for different types of poultry production before starting
- Make a thorough calculation of expected costs and revenues for different production systems
- Always keep records of your production and sale
- Keep your flock size manageable size to assure a feed resource in the environment
- Estimate the production of eggs and birds over the year
- Plan beforehand when and how you want to sell your birds
- Never introduce birds from the market directly to your flock
- Sell birds, if feed costs are too high or there are high risk of diseases or dwindling market prices
- Remember that costs involve investments, running costs, labour, losses, and maybe loan repayment and interest on loans
- Judge the risks involved in each type of production system before starting

ANNEX A: ADDITIONAL INFORMATION

- Fisseha Moges, Azage Tegegne and Tadelle Dessie. 2010. Indigenous chicken production and marketing systems in Ethiopia: Characteristics and opportunities for market-oriented development. IPMS (Improving Productivity and Market Success) of Ethiopian Farmers Project Working Paper 24. Nairobi, Kenya, ILRI
- Network for Smallholder Poultry Development: Keeping Village Poultry. A Technical Manual on Small-Scale Poultry Production
- The Australian Centre for International Agricultural Research (2009): Improving Village Chicken Production: A manual for Field Workers and Trainers
- Intervet International by the Netherlands (2009): Important Poultry Diseases